

LINEAR EQUATIONS

01 ● ● ● ● ●

If $3x + 7 = 22$, what is the value of x ?

A 3

B 5

C 7

D 9

LINEAR EQUATIONS

02 ● ● ● ● ●

Which value of y satisfies $2(y - 3) = 4y - 10$?

A $y = -2$

B $y = 2$

C $y = -1$

D $y = 4$

SYSTEMS

03 ● ● ● ● ●

If $x + y = 10$ and $x - y = 4$, what is x ?

A 3

B 5

C 7

D 9

INEQUALITIES

04 ● ● ● ● ●

Which inequality describes the solution to $-2x < 6$?

A $x < -3$

B $x > -3$

C $x < 3$

D $x > 3$

TRIANGLES

05 ● ● ● ● ●

A right triangle has legs of 6 and 8. What is the hypotenuse?

A 9

B 10

C 11

D 12

06

STATISTICS



The data set is: 4, 8, 6, 4, 9, 4. What is the mode?

A 4**B** 6**C** 7**D** 8**07**

STATISTICS



What is the median of: 3, 7, 2, 9, 5?

A 5**B** 6**C** 7**D** 3**08**

LINEAR FUNCTIONS



Line ℓ passes through (2, 5) and (6, 13). What is the y-intercept of ℓ ?

A 1**B** 2**C** 3**D** 4**09**

WORD PROBLEMS



Maria earns \$15/hr and has already earned \$120. She needs at least \$300 total. What is the minimum number of additional hours she must work?

A 10**B** 12**C** 14**D** 18**10**

ABSOLUTE VALUE



How many integer solutions does $|2x - 3| \leq 9$ have?

A 7**B** 9**C** 10**D** 11

11 RATIOS

A recipe uses flour and sugar in a ratio of 5:2. If 35 cups of flour are used, how many cups of sugar are needed?

A 10

B 12

C 14

D 16

12 PERCENTAGES

A laptop costs \$800 after a 20% discount. What was the original price?

A \$960

B \$980

C \$1000

D \$1020

13 SYSTEMS

If $3x + 2y = 16$ and $x = 2y$, what is y ?

A 1

B 2

C 3

D 4

14 FUNCTIONS

If $f(x) = 3x^2 - 2x + 1$, what is $f(-1)$?

A 2

B 4

C 6

D 8

15 LINEAR FUNCTIONS

Line m has slope $-2/3$ and passes through $(6, 2)$. What is the y -intercept?

A 4

B 5

C 6

D 7

16

QUADRATICS



What are the solutions to $x^2 - 5x + 6 = 0$?

☐ A $x = 1, 6$ ☐ B $x = 2, 3$ ☐ C $x = -2, -3$ ☐ D $x = -1, 6$

17

QUADRATICS



If $x^2 - 4 = 0$, what are the values of x ?

☐ A $x = 2$ ☐ B $x = \pm 2$ ☐ C $x = 4$ ☐ D $x = \pm 4$

18

TRIANGLES



Two angles of a triangle measure 45° and 70° . What is the third angle?

☐ A 60° ☐ B 65° ☐ C 70° ☐ D 75°

19

CIRCLES



A circle has radius 7. What is its area? (Use $\pi \approx 3.14$)

☐ A 43.96☐ B 153.86☐ C 154.00☐ D 146.00

20

CIRCLES



A circle with radius 5 has a sector with central angle 72° . What is the arc length?

☐ A 2π ☐ B 3π ☐ C 4π ☐ D 5π

21

STATISTICS



A data set has mean 18 and 6 values. One value of 12 is removed. What is the new mean?

A 18.6

B 19.2

C 20.4

D 21.0

22

STATISTICS



Which measure of central tendency is most affected by an outlier?

A Mean

B Median

C Mode

D Range

23

PROBABILITY



A bag has 4 red and 6 blue marbles. One marble is drawn. What is the probability it is red?

A $\frac{1}{4}$

B $\frac{2}{5}$

C $\frac{3}{5}$

D $\frac{4}{7}$

24

PROBABILITY



A fair coin is flipped 3 times. What is the probability of getting exactly 2 heads?

A $\frac{1}{4}$

B $\frac{3}{8}$

C $\frac{1}{2}$

D $\frac{2}{8}$

25

EXPONENTS



Which expression is equivalent to $(x^3 \cdot x^5) / x^4$?

A x^2

B x^3

C x^4

D x^6

26

WORD PROBLEMS



Two cars start 300 miles apart and drive toward each other. Car A travels at 55 mph, Car B at 70 mph. In how many hours do they meet?

A 2

B 2.4

C 3

D 3.6

27

INEQUALITIES



Which system of inequalities has no solution?

A $y > x$ and $y < x+1$ B $y > 2x$ and $y < 2x-3$ C $y > x$ and $y > 2x$ D $y < x$ and $y < 2x$

28

FUNCTIONS



If $g(x) = 2x - 5$ and $g(h(x)) = 2x + 1$, what is $h(x)$?

A $x + 1$ B $x + 3$ C $x - 3$ D $2x + 1$

29

RATES



Pipe A fills a tank in 4 hours, Pipe B in 6 hours. Working together, how long to fill it?

A 2 hr

B 2.4 hr

C 2.5 hr

D 3 hr

30

EXPRESSIONS



What is the value of $(a + b)^2 - (a - b)^2$ when $a = 5$ and $b = 3$?

A 60

B 64

C 72

D 80

31

SYSTEMS



The sum of two numbers is 72 and their difference is 28. What is the product of the two numbers?

A 1100

B 1100

C 1100

D 990

32

PROPORTIONS



If y varies directly as x^2 and $y = 48$ when $x = 4$, what is y when $x = 3$?

A 24

B 27

C 32

D 36

33

QUADRATICS



The vertex of $y = 2(x - 3)^2 + 5$ is at which point?

A (3, 5)

B (-3, 5)

C (3, -5)

D (5, 3)

34

QUADRATICS



For $y = x^2 - 6x + 8$, what is the minimum value of y ?

A -1

B -2

C -3

D -4

35

QUADRATICS



The sum of the roots of $3x^2 - 9x + 4 = 0$ is:

A 3

B 9

C $4/3$ D $9/4$

36

QUADRATICS



Which quadratic has roots at $x = 1$ and $x = -4$?

A $x^2 + 3x - 4$

B $x^2 - 3x - 4$

C $x^2 + 3x + 4$

D $x^2 + 5x - 4$

37

POLYNOMIALS



If $x - 2$ is a factor of $x^3 - 3x^2 + kx - 4$, what is k ?

A 1

B 2

C 3

D 4

38

RADICALS



What is the simplified form of $\sqrt{75} + \sqrt{48}$?

A $5\sqrt{3}$

B $7\sqrt{3}$

C $9\sqrt{3}$

D $11\sqrt{3}$

39

RADICALS



If $\sqrt{2x + 1} = 5$, what is x ?

A 10

B 12

C 13

D 16

40

EXPONENTS



What is $8^{(2/3)}$?

A 2

B 3

C 4

D 6

41

SIMILARITY



Two similar triangles have sides in ratio 3:5. If the smaller triangle has area 27, what is the area of the larger?

A 45

B 55

C 75

D 85

42

COORDINATE GEOMETRY



What is the distance between points $(-3, 4)$ and $(5, -2)$?

A 9

B 10

C 11

D 12

43

COORDINATE GEOMETRY



What is the midpoint of segment with endpoints $(2, 7)$ and $(8, 3)$?

A $(4, 5)$ B $(5, 4)$ C $(5, 5)$ D $(4, 4)$

44

ANGLES



Two parallel lines are cut by a transversal. One alternate interior angle is $(3x+10)^\circ$ and the other is $(5x-20)^\circ$. Find x .

A 12

B 13

C 14

D 15

45

TRIANGLES



In right triangle ABC with the right angle at B, $AB = 6$ and $BC = 8$. What is $\sin(A)$?

A $4/5$ B $3/5$ C $4/3$ D $3/4$

46

PROBABILITY



A standard die is rolled twice. What is the probability that the sum is 8?

☐ A $5/36$ ☐ B $6/36$ ☐ C $7/36$ ☐ D $4/36$

47

STATISTICS



The standard deviation of a data set is 0. This means:

☐ A The data has no mean☐ B All values are equal☐ C The data is skewed☐ D The range is 0

48

DATA INTERPRETATION



In a scatter plot, correlation coefficient $r = -0.92$ indicates:

☐ A No correlation☐ B Weak negative correlation☐ C Strong negative correlation☐ D Strong positive correlation

49

PROBABILITY



Events A and B are independent. $P(A) = 0.4$ and $P(B) = 0.5$. What is $P(A \text{ and } B)$?

☐ A 0.1☐ B 0.2☐ C 0.45☐ D 0.9

50

STATISTICS



A class of 30 students has an average score of 75. A second class of 20 students has an average of 85. What is the combined average?

☐ A 78☐ B 79☐ C 80☐ D 81

LINEAR MODELS

51 ●●●●●

A cell phone plan charges a flat fee of \$25/month plus \$0.05 per text. Another plan charges \$40/month with unlimited texts. For how many texts per month are the plans equal in cost?

A 150

B 250

C 300

D 350

FUNCTIONS

52 ●●●●●

For $f(x) = (2x + 3)/(x - 1)$, what value of x gives $f(x) = 3$?

A 4

B 5

C 6

D 8

WORD PROBLEMS

53 ●●●●●

A store marks up items by 40% then offers a 20% discount. What is the net percent change from the original price?

A 12%

B -12%

C 12% increase

D 20%

COMPOUND INTEREST

54 ●●●●●

\$2000 is invested at 5% annual interest compounded annually. What is the value after 2 years?

A \$2200

B \$2205

C \$2210

D \$2220

OPTIMIZATION

55 ●●●●●

A rectangle has perimeter 60 and its length is twice its width. What is the area?

A 150

B 175

C 200

D 225

56

SEQUENCES



The first term of an arithmetic sequence is 7 and the common difference is 4. What is the 20th term?

A 79

B 83

C 87

D 91

57

SEQUENCES



A geometric sequence has first term 2 and ratio 3. What is the sum of the first 5 terms?

A 240

B 242

C 244

D 248

58

POLYNOMIALS



What is the remainder when $2x^3 - 5x^2 + 3x - 1$ is divided by $(x - 2)$?

A 1

B 2

C 3

D 5

59

EXPONENTS



If $2^x = 32$ and $3^y = 27$, what is $x + y$?

A 6

B 7

C 8

D 9

60

RATIONAL EXPRESSIONS



Simplify: $(x^2 - 9)/(x^2 + x - 6)$

A $(x-3)/(x-2)$ B $(x+3)/(x+2)$ C $(x-3)/(x+2)$ D $(x+3)/(x-2)$

61

COMPLEX NUMBERS



What is $(3 + 2i)(3 - 2i)$?

☐ A 5☐ B 9☐ C 13☐ D 17

62

COMPLEX NUMBERS



What is i^{25} ?

☐ A 1☐ B -1☐ C i☐ D -i

63

LOGARITHMS



If $\log_2(x) = 5$, what is x ?

☐ A 10☐ B 25☐ C 32☐ D 64

64

LOGARITHMS



Simplify: $\log(100) + \log(0.01)$

☐ A 0☐ B 1☐ C 2☐ D 4

65

EXPONENTIAL GROWTH



A bacteria population doubles every 3 hours. Starting at 500, how many are there after 12 hours?

☐ A 4000☐ B 8000☐ C 16000☐ D 32000

66

FUNCTIONS



If $f(x) = x^2$ and $g(x) = x + 3$, what is $f(g(2))$?

A 7

B 25

C 16

D 10

67

CIRCLES



A circle has equation $x^2 + y^2 - 6x + 8y - 11 = 0$. What is its radius?

A 4

B 5

C 6

D 7

68

TRIGONOMETRY



If $\sin \theta = 3/5$ and θ is in the first quadrant, what is $\cos(2\theta)$?

A $7/25$ B $-7/25$ C $16/25$ D $-16/25$

69

3D GEOMETRY



A cylinder has radius 3 and height 8. A cone with the same base and height is cut out. What fraction of the cylinder's volume remains?

A $1/3$ B $2/3$ C $3/4$ D $1/2$

70

TRIANGLES



In triangle with sides 7, 24, and 25 — what is the area?

A 72

B 84

C 96

D 108

COORDINATE GEOMETRY

71 ●●●●●

Circle O has center (3, -2) and passes through (7, 1). What is the equation?

A $(x-3)^2+(y+2)^2=25$

B $(x-3)^2+(y+2)^2=16$

C $(x+3)^2+(y-2)^2=25$

D $(x-3)^2+(y-2)^2=25$

TRIGONOMETRY

72 ●●●●●

What is $\tan(45^\circ) + \sin(30^\circ)$?

A 1

B $3/2$

C 2

D $5/2$

PROBABILITY

73 ●●●●●

A box has 3 red, 4 blue, and 5 green balls. Two are drawn without replacement. What is $P(\text{both red})$?

A $1/22$

B $3/44$

C $1/12$

D $1/16$

NORMAL DISTRIBUTION

74 ●●●●●

Heights are normally distributed with mean 68 in and SD 3 in. Approx. what % of people are between 65 and 71 in?

A 34%

B 50%

C 68%

D 95%

SURVEYS

75 ●●●●●

In a survey, 40% of 1200 people preferred option A. What is the margin of error at the 95% level? (Use $\text{MOE} \approx 1/\sqrt{n}$)

A $\pm 1.4\%$

B $\pm 2.0\%$

C $\pm 2.9\%$

D $\pm 3.5\%$

76

CONDITIONAL PROBABILITY



$P(A) = 0.6$, $P(B) = 0.5$, $P(A \text{ or } B) = 0.8$. What is $P(A \text{ and } B)$?

A 0.1

B 0.2

C 0.3

D 0.4

77

EXPECTED VALUE



A game pays \$10 with $P=0.2$, \$4 with $P=0.5$, and $-\$3$ with $P=0.3$. What is the expected value?

A \$3.10

B \$3.50

C \$4.00

D \$2.90

78

STATISTICS



Box plot shows $Q1=30$, $Q3=50$. Which value is NOT an outlier by the $1.5 \times IQR$ rule?

A 5

B 8

C 72

D 85

79

INEQUALITIES



For which values of k does $kx^2 + 4x + 1 > 0$ for all real x ?

A $k > 4$ B $k > 3$ C $k < 4$ D $k > 2$

80

POLYNOMIAL ZEROS



How many positive real zeros can $f(x) = x^4 - 3x^3 + x^2 + 2x - 1$ have at most? (by Descartes' Rule)

A 1

B 2

C 3

D 4

81

QUADRATICS



For $ax^2 + bx + c = 0$, if the discriminant equals zero, the graph of $y = ax^2 + bx + c$:

☐ A crosses the x-axis twice☐ B touches the x-axis at exactly one point☐ C never touches the x-axis☐ D has no vertex

82

RATIONAL EQUATIONS



Solve: $1/(x-1) + 1/(x+1) = 1$. Which value of x is a solution?

☐ A $1 + \sqrt{2}$ ☐ B $1 - \sqrt{2}$ ☐ C $(1+\sqrt{5})/2$ ☐ D $(1+\sqrt{9})/2$

83

POLYNOMIAL GRAPHS



The polynomial $p(x) = (x-2)^2(x+1)$ has which behavior at $x = 2$?

☐ A crosses the x-axis☐ B touches and bounces off the x-axis☐ C has a vertical asymptote☐ D goes to infinity

84

FUNCTIONS INVERSE



If $f(x) = (x-3)/2$, what is $f^{-1}(4)$?

☐ A 7☐ B 10☐ C 11☐ D 12

85

EXPONENTS



Which is the value of $27^{2/3} \cdot 16^{1/4}$?

☐ A 12☐ B 16☐ C 18☐ D 24

86

POLYNOMIAL DIVISION



When $x^3 + 2x^2 - 5x + 1$ is divided by $(x+3)$, the remainder is:

A -11

B 11

C -5

D 7

87

EXPONENTIAL EQUATIONS



If $4^x = 8$, what is x ?

A $\frac{3}{4}$ B $\frac{3}{2}$ C $\frac{2}{3}$ D $\frac{4}{3}$

88

QUADRATIC APPLICATIONS



A ball is thrown up with height $h(t) = -16t^2 + 64t + 5$. What is the maximum height?

A 69 ft

B 70 ft

C 71 ft

D 72 ft

89

TRIANGLES



In $\triangle ABC$, angle $A = 30^\circ$, angle $B = 45^\circ$, and side a (opposite A) = 6. What is side b (opposite B)?

A $6\sqrt{2}$ B $3\sqrt{2}$ C $6\sqrt{3}$ D $4\sqrt{2}$

90

CIRCLES



Two tangent lines from external point P touch a circle at A and B . If $\angle APB = 50^\circ$, what is the arc AB (minor)?

A 100° B 120° C 130° D 160°

3D GEOMETRY

91 ●●●●●

A sphere has surface area 144π . What is its volume?

A 256π **B** 288π **C** 300π **D** 324π

TRIGONOMETRY

92 ●●●●●

If $\cos \theta = -4/5$ and $\sin \theta > 0$, what is $\sin(2\theta)$?

A $-24/25$ **B** $24/25$ **C** $-7/25$ **D** $7/25$

VECTORS

93 ●●●●●

Vector $u = (3, 4)$ and $v = (-1, 2)$. What is the dot product $u \cdot v$?

A 3**B** 5**C** 11**D** 5

COORDINATE GEOMETRY

94 ●●●●●

Line L : $3x - 4y = 12$. What is the shortest distance from the origin to L ?

A 2.0**B** 2.4**C** 2.8**D** 3.6

TRIGONOMETRY

95 ●●●●●

Which expression equals $\sin^2\theta + \cos^2\theta + \tan^2\theta + 1 - \sec^2\theta$?

A 0**B** 1**C** 2**D** $\sin^2\theta$

96

REGRESSION



A regression equation is $\hat{y} = 3.5x + 12$. What does the slope 3.5 represent?

A The y-value when $x=0$

B For each 1-unit increase in x , y increases by 3.5

C The correlation coefficient

D The residual

97

PROBABILITY



In a group of 80, 45 like math, 38 like science, and 20 like both. How many like neither?

A 7

B 14

C 17

D 23

98

SAMPLING



A study finds that students who eat breakfast score 8 points higher on average. This BEST supports which conclusion?

A Eating breakfast causes higher scores

B There is a correlation, but not necessarily causation

C Students who eat breakfast study more

D The study has no merit

99

COUNTING



How many 3-letter codes can be formed from $\{A, B, C, D, E\}$ if no letter repeats?

A 30

B 60

C 80

D 120

$P(B|A) = 0.6$, $P(A) = 0.5$. What is $P(A \text{ and } B)$?

A 0.1

B 0.3

C 0.6

D 1.1

Answer Key

Q1 B	Q2 B	Q3 C	Q4 B	Q5 B
Q6 A	Q7 A	Q8 A	Q9 B	Q10 C
Q11 C	Q12 C	Q13 B	Q14 C	Q15 C
Q16 B	Q17 B	Q18 B	Q19 B	Q20 A
Q21 B	Q22 A	Q23 B	Q24 B	Q25 C
Q26 B	Q27 B	Q28 B	Q29 B	Q30 A
Q31 A	Q32 B	Q33 A	Q34 A	Q35 A
Q36 A	Q37 D	Q38 C	Q39 B	Q40 C
Q41 C	Q42 B	Q43 C	Q44 D	Q45 A
Q46 A	Q47 B	Q48 C	Q49 B	Q50 B
Q51 C	Q52 C	Q53 A	Q54 B	Q55 C
Q56 B	Q57 B	Q58 A	Q59 C	Q60 A
Q61 C	Q62 C	Q63 C	Q64 A	Q65 B
Q66 B	Q67 C	Q68 A	Q69 B	Q70 B

Q71 A	Q72 B	Q73 A	Q74 C	Q75 C
Q76 C	Q77 A	Q78 C	Q79 A	Q80 C
Q81 B	Q82 A	Q83 B	Q84 C	Q85 C
Q86 D	Q87 B	Q88 A	Q89 A	Q90 C
Q91 B	Q92 A	Q93 B	Q94 B	Q95 B
Q96 B	Q97 C	Q98 B	Q99 B	Q100 B